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THE REDUCTION OF THE CRITICAL CURRENT UNDER TRANSVERSE PRESSURE IN A NEW TWCA MJR CABLED CONDUCTOR*

Johannes M. van Oort[1], Ronald M. Scanlan[1], Huub W. Weijers[2], and Herman H.J. ten Kate[2]

[1]Lawrence Berkeley Laboratory
AFRD, Superconducting Magnet Group
1, Cyclotron Road
Berkeley, CA 94720, USA
[2]Applied Superconductivity Center
University of Twente, Faculty of Applied Physics
P.O. Box 217
7500 AE Enschede, The Netherlands

ABSTRACT

The degradation of the critical current of several impregnated and insulated Rutherford type Nb3Sn cables is investigated under an applied transverse load and magnetic field. The cables are made of a new TWCA modified jelly-roll strand material which has been optimized for high critical current. The cables have various keystone angles and compaction factors and the dependency of the degradation on these parameters is described. The voltage-current characteristics are determined for the magnetic field ranging from 5 to 11 T and pressure up to 250 MPa. A micro-analysis of the strands is performed before and after the tests to determine possible damage to the filaments. It is found that the initial degradation and subsequent sensitivity to transverse pressure shows a strong dependence on the compaction at the narrow edge during cabling. For a cable in which the strands are deformed by 33 %, an initial degradation due to cabling is found to be 67 %, with a relative degradation of 25 % at 150 MPa. For a rectangular cable with a deformation of only 11 %, the initial damage is less than 2 %, with 3 % degradation at 150 MPa. Moreover, the heavily compacted cables tend to show irreversible damage, whereas the less compacted cables show a full recovery.

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